REMARKS

This amendment is made in response to the Office Action of May 19, 2006 in which claims 9-11 and 17-20 were withdrawn from consideration and remaining claims 1-8 and 12-16 were rejected.

Regarding the objection to the disclosure due to the typos in the body of the specification, applicant submitted a Preliminary Amendment B on November 15, 2005 in order to address the typographical errors throughout the specification. A Substitute Specification is submitted herewith which incorporates the Preliminary Amendment B as well as further changes to the specification to correct further errors found during the current review. Withdrawal of the objection to the specification is requested.

Regarding the objection to the claims, each of the items specified by the Examiner has been addressed by the above amendment to the claims and withdrawal thereof is requested.

Regarding the novelty rejection of claims 1, 2, 5-6 and 12 under 35 U.S.C. §102(b) as being anticipated by Hammer (U.S. 6,782,736), the Hammer reference does not show a feature of the present invention where two separate coils are used in such a way as to optimize the impedance variation as a function of content of the conductive phase as shown, e.g., by a combination of Figs. 4 and 5 of the present disclosure where Fig. 4 shows one coil optimized for increased sensitivity for oil/gas continuous mixture phase (the left side of the curve) and Fig. 5 shows the measurement results of using a coil configuration of an increased sensitivity for water continuous mixtures (right hand side of the curve). To the contrary, the curve shown in Fig. 7 of Hammer is rather insensitive, i.e., flat, in both the water-continuous area and the oil-continuous (water in oil) area. Hammer does not disclose optimization and merely discloses using different frequencies f1 and f2 in two different excitation coils using a single detector coil 56. He does this for the stated reason that the induced voltage in the detector coil is at anytime the sum of the induced voltage from the magnetic fields from the excitation coil and thus contains two frequencies. There is nothing said about optimization. Rather, the explanation given appears in column 5 at lines 32-39 that "by using different frequencies one has two independent equations which can be used to estimate water fraction and the conductivity of the water by use of mentioned mathematical models." The explanation goes on to say that "use of one frequency can provide both resonance frequency and impedance which gives two independent variables which also can be

used to estimate water fraction and conductivity in the fluid." But this seems to be related to the two curves shown in Fig. 7 with different points of abrupt decline in induced voltage with increasing water fraction at the transition between the water-continuous and the oil-continuous phases which seems to be related to a hysteresis phenomenon important for determining a dividing line between two boundary layers. This is quite different from the optimization disclosed and claimed for respective non-conductive continuous mixtures and conductive continuous mixtures. This is not shown or suggested by Hammer. Therefore, Hammer is inapplicable as a 35 U.S.C. § 102(b) reference against claims 1, 2, 5-6 and 12 and withdrawal of the rejection on that ground is requested.

Regarding the 35 U.S.C. § 103(a) rejection of claims 3-4, 7-8 and 13-16, these claims all depend from amended claim 1 or 12 and are at least patentable for the same reasons as given above in connection with applicant overcoming the novelty rejection. Regarding claim 3, it has been amended to include the limitations of claim 1 and claim 14 has been amended to include the limitations of claim 12. The sensor in the present invention can be constructed such that the resonant frequency of the coil is independent of the fraction of the conductive component in the liquid mixture. This is possible because when the volume fraction increases the inductance of the coil decreases while the fringe capacitance of the coil increases and vice versa. Therefore, the resonant frequency is constant if the stray capacitance changes in the same degree as the inductance.

This principle demands that the conductive component has a constant conductivity. However, this is not the case for process water. By varying the conductance, we will achieve a varying resonance frequency. Then it is important that the copper wire used in the coil has a thickness less than skin depth of copper at the highest resonant frequency. Therefore, the copper loss in the coil is constant even if the frequency varies. This feature is present in the former dependent claims 3 and 14 which have been amended to become independent due to the already paid number of four independent claims, two of which have been cancelled on account of the restriction requirement.

In the present invention, the sum of the electric losses in the coil and measuring medium is measured. Therefore, it is necessary that the power loss in the coil is constant to achieve a unique measurement.

Based on the foregoing, it is believed that the amended claims 3 and 14 are also patentably nonobvious. It should also be mentioned that the present invention involves the avoidance of frequency dependent resistance in the coil windings to

maintain a constant copper loss in the coil. How this is accomplished cannot be found from the Hammer reference.

Withdrawal of the 35 U.S.C. § 103 rejection of claims 3-4, 7-8 and 13-16 is requested.

The objections and rejections of the Office Action of May 19, 2006, having been obviated by amendment or shown to be inapplicable, withdrawal thereof is requested and passage of claims 1-8 and 12-16, as amended, is requested.

Respectfully submitted,

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